UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING

FIELD LETTER FOR AUGUST AND SEPTEMBER to October 1, 1915. No. 8.

DIVISION OF CONSTRUCTION
V. M. Peirce, Chief

Projects:

Object-lesson Roads.

During August and September the following object-lesson roads were completed: A gravel road in Posey County, Indiana, by W. H. Lynch, S.H.E.; a gravel road in Burleigh County, North Dakota, by J. H. Dodge, S.R.C.; an earth road in Thurston County, Nebraska, by F. A. Davis, J.H.E.; and a bituminous macadam road in Alamance County, North Carolina, by J. H. Eldridge, S.R.C.

The following work is now under way: Resurfacing a worn-out macadam road with gravel, Spencer County, Indiana, by W. H. Lynch, S.H.E.; repairing a macadam object-lesson road built in 1911 in Richardson County, Nebraska, by J. H. Dodge, S.R.C.; a gravel road in Crawford County, Arkansas, by Jas. C. Wonders, S.H.E.; an earth road in Cleburne County, Arkansas, by Charles T. Harrison, S.R.C.; an oil-corraline rock road in Alachua County, Florida, by E. S. Alderman, J.H.E. F. A. Davis, J.H.E. has been assigned to Lincoln Parish, Louisiana, to build a series of earth and sand-clay object-lesson roads.

Post Roads.

The post road in Bath and Montgomery Counties, Kentucky, was completed August 12, 1915. R. E. Toms, S.H.E., who was in charge, will now devote his entire time to cooperating with the State Highway Department of Kentucky in improving State-aid roads. R. E. Royall, J.H.E., who has been assisting Mr. Toms, has been assigned to assist J. C. Wonders, S.H.E., on an object-lesson road at Alma, Arkansas.

The work onthe Maine post road has been materially delayed on account of bad weather but the surfacing was completed throughout the entire length of 20.94 miles September 24. However, considerable work remains to be done in shaping shoulders, etc. L. S. Hall, J.H.E., who had been assisting E. O. Hathaway, S.H.E., on this work, resigned July 24, and H. S. Parry, J.H.E., was assigned August 27 in his place.

The work on the Mississippi post road has been progressing satisfactorily the last two months and practically the entire mileage included in the designated post road has been completed. Three extensions to this post road having a total length of about 2 miles are being built under our supervision

The section of the North Carolina, Old Fort Township post road let to contract, extending from Old Henry to Greenlee, has been completed. Upon the completion of this section it was evident that there was not sufficient money remaining to complete the road from Old Henry to Ridge Crest and arrangements were made with the State authorities to furnish convict labor free of any charge tothe joint fund to complete it. This work is progressing satisfactorily but slowly, as the force of convicts is rather small.

The post road in Forsyth, Davie, and Iredell Counties, North Carolina, was completed August 10. Mack Galbreath, J.H.E., who had been in charge for some time, was assigned to assist Mr. Moorefield on the Ohio Post Road.

The section of the South Carolina post road from Aiken east to the county line through Montmorenci has been completed and satisfactory progress is being made on the north section.

Progress on the post road in Loudon County, Tennessee, has been slow due to bad weather and small force of labor employed. Practically all of the surfacing material is now in place and the principal work now remaining to be done is that of shaping shoulders, etc.

The joint fund, as anticipated, was not sufficient to surface the entire length of the Tennessee, Montgomery County, post road and the county authorities intended to appropriate sufficient money to complete it. The bond issue from which this money was to be obtained was enjoined and the work on the post road was immediately shut down. The entire length of the post road was graded, but only about half of it was surfaced.

That part of the Texas Post Road in Bexar County, is completed, that part in Hays and Travis Counties practically completed, but little has been done in Comal and Guadalupe Counties. Mr. Rideout, J.H.E., who assisted Mr. Crossland in Bexar County, has been assigned to assist Mr. Rhodes on the Old Fort Township, North Carolina, post road.

The post road in Fairfax County, Virginia, was completed June 26. Since this time, Mr. Fauntleroy, S.H.E., and A. S. Hathaway, J.H.E., have been engaged in preparing a final report and in making surveys and plans for a road from the post road into Mount Vernon.

Advice and Inspection.

W. A. Crossland, S.H.E., was assigned August 5 to advice with the county authorities at Arkansas Pass, Texas, relative to surfacing material for a system of roads proposed to be improved under a recent bond issue of $50,000. Mr. Crossland also inspected certain roads in Kerr County, Texas, and prepared estimates of the cost of improving them, as information for a proposed bond issue.

B. H. Burrell, S.H.E., inspected and estimated the cost of improving 187 miles of road and prepared plans for a county system of main roads for Washington County, Mississippi, as information for a proposed bond issue of about $1,000,000.

B. F. Heidel, S.H.E., has continued his work of cooperating with the State Geologist of Georgia in making a survey of the State for road materials. He also cooperated with the local authorities of Knox County, Tennessee, in selecting types of road surfacing for the roads to be improved from the proceeds of a $500,000 bond issue.

J. W. Janssen, H.E., has completed the surveys, plans, and specifications for improving about 50 miles of road in Manatee County, Florida. The surfacing material used will be modified asphalt.

H. L. Arbenz, S.H.E., has practically completed the survey, plans, and specifications for building 12 miles of sand-clay road in Eastville District, Northampton County, Virginia.

R. E. Toms, S.H.E., has been assigned to accompany a committee to investigate and select a route for the Jackson Highway from Nashville to New Orleans.

B. H. Burrell, S.H.E., has been assigned to accompany representatives of the Southern National Roads Association to select the route for a highway from San Diego, California, to Washington, D. C.

R. F. Eastham, H.E., surveyed and prepared plans for about 40 miles of road and advised relative to the construction of several short sections of road in Weakley County, Tennessee.

Field Experiments.

Contracts were let for surface-treating the post road in Montgomery County, Maryland, with 5 different bituminous materials. J. H. Eldridge, S.R.C., has been in charge of the work, which is now practically completed.

The grading and the gravel base provided for the Mount Vernon Avenue and Russell Experimental Roads are practically completed and about half of the Mount Vernon Avenue Road has been surfaced. It is probable that the surfacing of the Russell Road will be postponed until next year.

Bridges and Culverts,
O. L. Grover, in Charge.

Designs were prepared for five wooden bridges to be built over the drainage canals of the Mattamuskeet Drainage District, Hyde County, North Carolina. Designs were also prepared for two draw bridges and approaches for Manatee County, Florida. Details were checked and approved for four steel bridges being constructed in Durham County, North Carolina. Design for a steel bridge in Aroostook County, Maine, was also checked. Work is being continued on bridge bulletin.

RURAL ENGINEERING AND FIELD EXPERIMENTS.
E. B. McCormick, Mechanical Engineer.

Projects:

General

In connection with the rural engineering work, a study was made during the first part of September with a view to obtaining a record of requests from May 1 to September 4. It was interesting to note that during May there were 31 requests received, in June there were 50, in July 103, and in August 102. These requests came from every State in the Union except Nevada, Utah, Vermont, and South Dakota. In addition there were requests from the Canal Zone, Canada, and the Hawaiian Islands.

Domestic Water Supply and Drainage.

G. M. Warren, D.E., is engaged in this work in part. The plans and specifications for the septic tank and sub-irrigation disposal system for H. T. Newcomb of Bethesda, Maryland, mentioned in the last two Field Letters, has been accepted by the Maryland State Board of Health and steps are now under way to construct the plant.

There have been five examinations and reports made relative to domestic water supplies or sewage and drainage disposal systems. On September 10 Mr. Warren delivered an address on "Water Supply and Sewage Disposal" before the Women's Civic League of East Falls Church, Virginia. During the past two months there has been much correspondence in connection with this line of the work. Articles in the technical press have been reviewed, interviews and advice relative to many phases of farm water supply and distribution and sewage disposal have been given.

Farm Buildings.

Many requests for advice and blueprints have been received and answered. The following designs have been completed: extension to hog house at Beltsville Experimental Farm, for the Division of Animal Husbandry; poultry house at Beltsville 14 by 108 feet for the same division; the drawings for this poultry house are available to the public. Hay-shed, open center construction, having trussed frame which leaves center free of braces. Laboratory and office at Denver, Colorado, for Divisions of Drainage and Irrigation. Corn crib (almost completed) capacity 2,000 bushels; principal features are ventilation, rot-proofing, and substantial construction. Plans for a six-room farm house.

On September 1, C. S. Haynes, draftsman, and Frank B. Philips, architectural draftsman, reported in this Division from the Dairy Division of the Bureau of Animal Industry, to work for that Division under the direction of Mr. Page. They have been engaged in the following lines of work: preparation of preliminary and final layouts for stock creameries, chain ensilage conveyor for silos, wooden-hoop silo design, and plans for a bungalow for the New Iberia Experimental Station in Louisiana.

Problems Involving Mechanical Principals.

The number of requests for information and advice relating to the following lines of work continue to increase and have received attention during the past two months: electric light and power plants, ice and refrigerating houses for family purposes, residential heating plants, utilization of stream flow for generation of power on farm, internal combustion engines, and miscellaneous questions coming under this head. The <u>assistance of field men</u>, which was requested in the past two Field Letters in connection with the noting of farm power plants which might be located in the districts in which they are working, is <u>again urged</u>. The Division has not as yet received <u>any</u> reports and desires to call this to their attention again.

Cooperative Work in Rural Engineering.

The cooperative field work in the investigations of thresher explosions which have been conducted throughout the wheat-growing districts of Washington, Idaho, and Oregon, and which was mentioned in a previous letter, has been completed and Assistant Agricultural Engineers J. Clay Woodson and J. E. Young have reported in Washington to complete their reports under the personal direction of Mr. McCormick. This field work consisted in the investigating of all fires occuring in threshing machines with a view to determining the exact causes of such fires, the conditions necessary for such occurrence, and the determination of a means of overcoming this trouble. The "grounding" of the cylinders to eliminate static electricity, "fan blower" systems to remove the smut dust, "sprinkler" systems and, chemical fire extinguishers to extinguish fires when started, have been experimented with. About 130 explosions were investigated and full data obtained in each case. A study of

the data seemed to indicate that the quantity of smut present probably makes little difference as it was found to range from 1 and 2 per cent to 60 per cent. There were two colors of smut found, the black and red, the latter in laboratory tests proving to be the more inflammable. There were fourteen machines experimented on, all of which went through the season without fires while on every side others burned. The loss probably averages about $750 to the machine burned. From the results of the experiments conducted it seems advisable to recommend the grounding of the cylinder and other parts and the installation of an extinguisher and a blower system.

Field Experiments - Traction Tests.

The dynamometer wagon which was wrecked at Old Fort, N. C., has been rebuilt with slight changes in design. It was calibrated in the machine shop and after testing out in Virginia, Elmer Johnson, A. M.E., has completed the final test on the recently completed Virginia post road, from Alexandria to Pohick. From Alexandria, the wagon was shipped to Old Fort, N. C., and Mr. Johnson is now running tests on this post road.

Four of the spiral springs, which are the basic element of the torsion dynamometer of the dynamometer car, have been secured and are being given the service test.

A. B. Harrison and H. E. Cole have been taken on as student assistants to assist Mr. Cilley in looking up traction test data. The original data on the Greenwood, Mississippi, project is being worked up.

DIVISION OF ROAD MAINTENANCE.
E. W. James, Chief.

Projects:

Advice and Inspection.

G. C. Scales, S.H.E., inspected the road from Columbia to Spartanburg, S. C., in Newberry, Union, and Spartanburg Counties, and gave general advice regarding relocations and improvement of alignment.

V. E. Towles, H.E., who was on leave from August 20 to August 30, has returned to the Washington-Atlanta Highway and is now in Harnett County, N. C.

Representative State Systems.

On August 19 and 20, E. W. James visited Baltimore and Harrisburg for the purpose of studying the maintenance accounting systems in use by the Maryland and Pennsylvania Commissions. Arrangements were made for extensive inspection of patrol work in both States at a later date.

Post Road Maintenance.

On September 10 to 19, E. W. James inspected the Maine and Ohio post roads and visited the Commissions of those States with a view to making arrangements for systematic maintenance on the post roads: The arrangements desired contemplate the keeping of cost data and systematic traffic records, so that the same correlation of traffic and maintenance costs can be made for these post roads as is being made on the experimental roads near Washington. The extension of such studies on

the proportionately large mileage furnished by the post roads will increase their value very greatly.

The surface treatment of the Maryland post road is about complete and appointment of a patrolman has been requested as of October 1. Maintenance will be started at once, and the road will be included in the experimental roads and handled in the same way as the others.

The Tennessee, Kentucky, Mississippi, and Texas Post Roads will soon be inspected with a view to arranging for their maintenance. It is probable that the Greenwood, Mississippi, post road will be included in a county superintendence project in LeFlore County.

Washington-Atlanta Highway.

As suggested in the last letter, Nottoway and Lunenberg Counties, Virginia, have made application for supervision of maintenance, the necessary inspections and estimates having been made by E. W. James and D. H. Winslow. These two counties are added to Mr. Winslow's section.

On August 22, E. W. James and D. H. Winslow visited Lawrenceville, and on September 6, Dinwiddie, to confer with the authorities in Brunswick and Dinwiddie Counties, Virginia, regarding the renewal of supervision in those counties.

In the Manufacturer's Record of August 26th there was an article by Mr. James on the results of a year's work on the Highway.

The bridge over Lynch's River bottom in W. L. Spoon's division has been practically completed, and Mr. Spoon has resumed his systematic trips over his route.

G. C. Scales reports continued marked progress in grading work throughout the counties in his division in Georgia.

New Projects.

The conditions under which the Office will cooperate in maintaining the Central Highway in North Carolina have been fixed, and the State Highway Commission is now making the necessary arrangements with the counties concerned. On this road it will be necessary for the counties not only to provide transportation, but also to pay their pro rata of the transportation charges. If all counties make application, it is estimated that the cost per month for each county will not exceed $4.

The chief of the division is arranging an itinerary extending from October 7 to about November 15, during which time he will visit points between Brooksville and St. Petersburg, Florida, and complete arrangements, if possible, for the maintenance of that road under Government supervision. It is hoped also that the McGregor Boulevard from Fort Myers to Punta Rassa will also be included in this project, to which one engineer will be assigned. These roads comprise about 75 miles of practically all the common types constructed in Florida - sand-clay, coralline, limestone, bituminous macadam, brick, marl, bituminous-surfaced marl, shell, and bituminous-surfaced shell.

Field Experiments

The reconstruction of Bradley Lane as a bituminous macadam, penetration method, was completed on September 15, practically as stated in the July letter, except that 3,613.5 linear feet were penetrated with an asphaltic oil, using approximately 2 gallons to the square yard, and the remaining 200 feet (from stations 19 to 21) were penetrated with sand-oil grout. Some principal cost items follow:

Items		Total Cost	Unit Cost
Excavation, 793 cu. yds			0.4704
Subdrains, 2090 feet			0.2145
Scarifying, 5,316 sq. yds			0.0304
Shaping shoulders and subgrade, 4064 sq. yds			0.0371
Foundation stone, 146.775 tons:			
11.115 tons at $1.15	$12.78		
22.36 " " $1.13	25.27		
113.30 " " $1.03	116.70		
135.66 " loaded at $.10	13.57		
(146.775 " hauled at $0.30616	44.94		
(146.775 " spread at $0.0399	3.86		
Rolling stone	85.00		
Contractor's supervision on last three items	20.35	322.47	2.196
Wearing course (penetration) 6421 sq.yds:			
21.42 tons stone at $1.15	24.63		
1044.25 " " " $1.13	1280.01		
1044.25 " " loaded at $.10	104.43		
8 cords wood at $5 a cord	40.00		
Hauling away tins	15.00		
(1065.67 tons stone hauled at $.30616	326.26		
(804.32 " " spread at $.0399	32.09		
(Rolling stone	100.00		
(Hauling 13,478 gal. bitumen to job	60.98		
(Heating 13,478 " "	51.20		
(Pouring 13,552 " "	52.00		
(Spreading 261.35 tons chips	48.80		
Contractor's supervision on last 7 items	88.42	2,133.81	0.3322
Wearing course (sand oil grout) 367 sq. yds.			
$1\frac{1}{2}$ tons sand at $1.50	2.25		
2 cords of wood	10.00		
51.65 tons stone at $1.13	58.36		
51.65 " " loaded at $.10	5.17		

(39.65 tons stone spread at $.0399.....	1.58		
(51.65 " " hauled " $.30616....	15.81		
(Rolling stone.....	10.00		
(Heating sand.....	2.40		
(Mixing sand and oil.....	4.00		
(Heating 672 gals. oil.....	2.40		
(Pouring 672 " "	4.40		
(Spreading 12 tons chips.....	3.60		
Contractor's supervision on last 8 items.....	6.72	126.69	0.3452

The total cost of the work, including extras, was $6,565.40. Of this, Montgomery County paid approximately $750 under its contract with this Office. S. L. Taylor, J.H.E., was engineer on the project, assisted by D. G. Haire, S.R.C.

Bids have been opened and award recommended for re-treating section 6 of the Rockville Pike before October 15, with hot water-gas tar preparation.

The various re-treatments completed this season are now about completed and the costs are detailed below:

RETREATMENT OF SECTION 1, ROCKVILLE PIKE.
July 12 to July 23, 1915.

Area treated..... 15,000 sq. yds.
Top dressed with gravel.

Materials:
Road tar, 6375 gals., 0.425 gal. per sq. yd.
Gravel, 205.03 cu. yds., 0.01447 cu. yd. per sq. yd. or 69.11 sq. yd. per cu. yd.

Costs:

Road tar,	$573.75,	$0.03825 per sq. yd.
Gravel,	$647.15,	0.04314 " " "
	$1,220.90	$0.08139

Labor - Sweeping road	$39.45	$0.0026 per sq. yd.
Spreading tar	58.41	0.0039 " " "
Hauling gravel	74.22	0.0049 " " "
Spreading gravel	149.36	0.0099 " " "
Rollerman	10.00	0.0007 " " "
Nozzleman	1.00	0.00007 " " "
Repairs to roller	3.00	0.0002 " " "
Watchman	17.72	0.0012 " " "
1 team, 8 hrs. (spec.)	5.00	0.0003 " " "
Miscellaneous purchases	8.50	0.00057 " " "
Supervision	38.50	0.0026 " " "
	$405.16	$0.0269

Total cost of material	$1,220.90	$0.0814
" " " labor	405.16	0.0269
Grand total	$1,626.06	$0.1083

RETREATMENT OF SECTION 3, ROCKVILLE PIKE.
June 25 to and including June 30, and August 16 to August 18, 1915.

Area treated..... 7,400 sq. yds.
Top dressed with Torpedo sand.

Materials:

Bitumen, 1,224 gallons, 0.165 gal. per sq. yd.
Torpedo sand, 116 cu. yds., 0.016 cu. yd. per sq. yd. or 62.5 sq. yd. per cu. yd.

Costs:

Bitumen (Mexican Oil)	29 barrels	$104.26	$0.0141+ per sq. yd.
Sand 116 cu. yds		263.52	0.0356+ " " "
		$367.78	$0.0497

Labor - Sweeping road	$11.57	$0.0016 per sq. yd.
Spreading oil	39.77	0.0054 " " "
Pouring oil	23.14	0.0031 " " "
Spreading sand	32.00	0.0043 " " "
Supervision	39.72	0.0054 " " "
Hauling sand	4.50	0.0006 " " "
	$150.70	$0.0204

Total cost of labor	$150.70	$0.0204
" " " material	367.78	0.0497
	$518.48	$0.0701

RETREATMENT OF SECTION 7, ROCKVILLE PIKE.
June 21 to and including June 23, 1915

Area treated.....11,148 sq. yds.
Top dressed with torpedo sand. Job done by hand.

Materials:

Bitumen, 2269.5 gals. distributed at .204 gal. per sq. yd.
*Torpedo sand, 124.8 cu. yds. spread at $ .0112 cu. yds per sq. yd. or at 89.33 sq. yds. per cu. yd.
*South 300 feet only top dressed with concrete sand.

Costs:

Bitumen,	$241.32	$0.0216 per sq. yd.
Sand,	259.68	0.0233 " " "
	$501.00	$0.0449

RETREATMENT OF SECTION 7, ROCKVILLE PIKE (continued)

Labor -	Sweeping road	$13.30	$ 0.0012 per sq. yd.
	Pouring oil	10.83	.0010 " " "
	Brooming oil	60.65	.0054 " " "
	Spreading sand	45.43	.0039 " " "
	Supervision	22.50	.0020 " " "
		$152.71	$0.0135

Total cost of labor	$152.71	$0.0135 per sq. yd.
" " " material	501.00	.0449
Total	$653.71	$0.0584

RETREATMENT OF SECTION 9, SOUTH KENSINGTON ROAD.

Area treated..... 761 sq. yds.
Top dressed with Torpedo sand.

Materials:

Trinidad, 150 gallons, 0.197 gal. per sq. yd.
Torpedo sand, 12.25 cu. yd. 0.016 cu. yd. per sq. yd. or 62.5 sq. yd. per cu. yd.

Costs:

Bitumen (Trinidad) 3 barrels	$20.00	$0.0262 per sq. yd.
Sand, 12.25 cu. yds.	27.32	0.0359 " " "
	$47.32	$0.0621

Labor -	Sweeping road	$1.28	$0.0012 per sq. yd.
	Spreading oil	1.90	0.0019 " " "
	Pouring oil	2.54	0.0025 " " "
	Spreading sand	2.54	0.0025 " " "
	Hauling sand	1.49	0.0015 " " "
	Supervision	3.55	0.0035 " " "
		$13.30	$0.0131

Total cost of labor	$13.30	$0.0131
" " " material	47.32	0.0621
	$60.62	$0.0752

RETREATMENT OF SECTION 10, SOUTH KENSINGTON ROAD.

Area treated..... 1013 sq. yds.
Top dressed with Torpedo sand.

Materials:

Trinidad, 175 gallons 0.172 gal. per sq. yd.
Torpedo sand, 16.25 cu. yds. 0.016 cu. yd. per sq. yd. or 62.5 sq. yds. per cu. yd.

Costs:

Bitumen (Trinidad) $3\frac{1}{2}$ barrels	$24.80	$0.0245 per sq. yd.
Sand, Torpedo, 16.25 cu. yds.	36.24	0.0357 " " "
	$61.04	$0.0602

Labor - Sweeping road	$1.68	$0.0017 per sq. yd.
Spreading oil	2.53	0.0025 " " "
Pouring oil	3.37	0.0033 " " "
Spreading sand	3.37	0.0033 " " "
Hauling sand	1.97	0.0019 " " "
Supervision	4.70	0.0046 " " "
	$17.62	$0.0173

Total cost of labor	$17.62	$0.0173
" " of material	61.04	0.0602
	$78.66	$0.0775

DIVISION OF NATIONAL PARK AND FOREST ROADS.
T. Warren Allen, Chief.

Projects:

Work for month of August.

National Park Roads.

In the Yosemite National Park, work on road plans was suspended temporarily and J. W. Ball, J.H.E. reported to B. J. Finch, S.H.E., at Portland, Ore., for duty on road survey work in Skamania County, Washington. In Glacier National Park, work was continued on road plans to which reference was made in the last Field Letter. The chief of the division in the early part of August made an inspection of the road construction in progress in the RockyMountain National Park, Colorado, and also made a reconnaissance along the route which an extension of this road is likely to follow; the construction is in charge of the County Engineer of the County in which the road is situated, and is being paid for partially by the State of Colorado and partially by the National Park Service.

National Forest Roads.

In districts 2 and 3 no changes of importance have taken place. In District 4, Mr. C. H. Kendall, S.H.E., made a reconnaissance of the Idaho-Warren State Wagon Road, Idaho, and an inspection of the construction on the Daniels Canyon Road,

Uinta National Forest, Utah. In district 5, California, plans for the lower section of the Trinity River Road have been approved and the necessary right-of-way arranged for. In district 6, the survey of the Mount Hood-Government Camp Road, Oregon National Forest, Oregon, was begun with Jas. T. Schuyler, S.H.E. in charge.

County Work.

Under the supervision of B. J. Finch, S.H.E., J. W. Ball, J.H.E., began a survey for a road along the Columbia River for the county of Skamania, Washington. This survey has been divided into three sections of approximately ten miles each with one survey party at work on each section. One short piece of road for which the plans have been completed, has been advertised for construction, bids to be opened September 7. During the month the chief of the division visited Yakima, Benton, and Walla Walla Counties, Washington, and made a study of road conditions with the view of arranging for a series of road lectures to be given late in September or early in October. On August 20th, C. H. Kendall delivered an illustrated lecture on roads before a meeting on roads at Bozeman, Montana.

Work for Month of September.

Forest Service Work

District No. 2. Work has progressed rather slowly on the Rabbit Ear Road, Routt Forest, Colorado, during September, due to difficulty in obtaining teams. It is hoped, however, to get the road open this fall, so as to enable traffic to move over it more freely next fall. This road is a link in one of the main east and west roads across the State of Colorado, and although the grades of the road as now being improved are rather heavy, the opening of the road can not fail to be very beneficial. This road was inspected by the chief of the division during the month. An inspection was also made of the Cochetopa Pass Road in the Cochetopa National Forest, Colorado. This is a link in the road between Saguache and Gunnison. Part was constructed two years ago and part last year. The present condition of this road is very good, especially the part constructed last year, and traffic over it is quite heavy.

In South Dakota, in the Black Hills, work during September consisted entirely of maintenance.

In Wyoming, construction was continued on the Buffalo-Hazelton Road in the Big Horn Forest.

District No. 3. Survey work on the road running north from the Salt River Road in Arizona, a projedt for which plans were approved earlier in the year, was completed, and the survey party was shifted to another project. Construction work in Arizona will not be undertaken until next spring.

In New Mexico, construction work continues in progress on the Red River Road, but considerable trouble is being had in procuring the necessary teams. Upon completion of this project, a prohibitive grade on the road between Red River and Ute Park, will be eliminated. This road was inspected by the chief of the Division during the month.

District No. 4. In Utah, work was in progress on the Kamas-Stockmore Road, but will soon be closed down on account of lack of funds. Very good results are being obtained on this road, and the local people seemed well pleased. This project will be continued during the coming year.

In Idaho, construction work is progressing but slowly on the Payette River Road, due to shortage of funds.

In Wyoming, the Teton Pass Road is being closed down for the season, though work continued throughout the month. Very excellent results have been obtained on this road. It has been possible to secure very easy grades, and the construction work has been well handled.

The Kamas-Stockmore and the Teton Pass Roads were both inspected during the month by the chief of the division, as was also a projected connection from Gibbonsville in Idaho with the Bitternot project constructed in Montana by District No. 1, last year.

District No. 5. In California, little was done during the month.

District No. 6. In Washington, construction was continued, but very greatly interfered with on the Little White Salmon Road in the Columbia Forest, by the withdrawal of the road force to fight fires. In Oregon, very little construction work was done except on the Rogue River Trail. The survey for the connecting of the Hood River Valley by road with the country to the southwest of Mt. Hood, was continued, and very satisfactory progress made. It has been possible to get a location for this mountain road, upon which the grades will not exceed four per cent.

Park Road Work.

The only work done during the month was in Glacier National Park, giving lines and grades for the construction of the Fish Creek Road, and continuing the preparation of plans for the road around Lake McDonald, the survey for which has been completed.

Skamania County, Washington.

Surveys were continued for the road along the Columbia River, and plans practically completed for the central section about nine miles. The plans for one short stretch of this section were completed. Bids were asked for and received to construct it, but it was considered that the bids were too high, and they were all rejected. This short piece will now be added to the remainder of the central section and bids asked for the construction of the whole.

DIVISION OF ROAD ECONOMICS.

J. E. Pennybacker, Chief.

Projects:

Statistical Investigations.

The assembling of statistics on road mileage, revenues, and expenditures is practically complete for fourteen states. One-fourth of the information is in for five states, one-third for three states, one-half for seventeen states, and three-fourths for six states, and in only one state, Pennsylvania, has nothing been collected.

Convict Labor Studies and Experimental Convict Camp.

Arrangements for the establishment of an experimental convict camp in Fulton County, Georgia, have been completed and the portable camp buildings which will house the convicts are now being constructed in Atlanta. The plans for these buildings were prepared by the Office and the camp will be operated under Office direction.

Work on the preparation of a bulletin on the subject of convict labor is being continued and it is expected that much valuable data, derived from a study of the experimental camp, may be included in this and a subsequent bulletin.

Advice to State Highway Departments.

E. H. Barber spent the early part of September advising with the Tennessee Highway Department in regard to plans for organization.

Road Management Studies

A. S. Brainard was engaged during the latter part of September in making road management studies of Milwaukee County, Wisconsin, and Dickinson County, Michigan.

The results of the road management studies are being tabulated by B. L. Vipond as to the organization and accounting methods of the several counties reported on.

Road Material Freight Rates.

Data in regard to railroad freight rates on crushed rock have been tabulated for each of the principal southern railroads by B. L. Vipond, an accountant transferred to this Office from the Government Printing Office in July. These tables demonstrate the wide divergence in rates between the railroads as well as between the divisions of the same railroads.

Lectures and Road Models.

Road models were exhibited by J. J. Tobin, A.R.E., at the state fairs at Louisville, Kentucky, September 13-17; Nashville, Tennessee, September 20-25; and the Tri-State Fair at Memphis, Tennessee, September 26-October 5.

A. S. Brainard had charge of the road model exhibit at Rutland, Vermont, Fair and Horse Show, September 6-10. This set of models was shipped to Marshall, Virgini where it was displayed, September 29-30, at the Fauquier County Fair, by R. F. Eastham. From Marshall it goes to Raleigh, North Carolina, for use at the State Fair, October 18-21.

A road model exhibit was made at the Wisconsin State Fair, September 13-17, and at the Copper County Fair, Houghton, Michigan, September 28 to October 2. Demonstrator, A. S. Brainard, S.H.E.

An exhibit of road models was made at the Seventh Annual Cotton Carnival and Exposition, Galveston, Texas, July 22 to August 1.

A road model exhibit is now being made at the Dry Farming Congress and Exposition, Denver, Colorado, September 22 to October 9. L. E. Boykin, A. R. E., demonstrator.

The exhibition of models which was to have been made at Pittsburg, Pennsylvania, under the auspices of the Western Exposition Society of Pittsburgh, was abandoned. The models intended for this purpose were at Galveston, Texas, and were delayed in transit to Washington on account of the recent storm at Galveston.

George D. Marshall, S.R.C., relieved M. O. Eldridge, A. R. E., at the Panama-Pacific Exposition on August 20, and Mr. Eldridge returned to his duties in Washington on September 20.

J. E. Pennybacker attended the meeting of the Pan-American Road Congress at Oakland, California, September 13-17. On his return to Washington he stopped at Denver, Colorado, to make arrangements for an exhibition of Office models at the Dry Farming Congress and Exposition.

L. E. Boykin lectured at Osceola, Arkansas, McAllister, and Wewoka, Oklahoma, Arkansas City, Kansas, and six other points in southwestern Kansas, during September

A. S. Brainard is to deliver a lecture at Poy Sippi, Wisconsin, on October 5.

DIVISION OF ROAD MATERIAL TESTS AND RESEARCH.
Prévost Hubbard, Chief.

Projects:

Administration.

Since the publication of the August Letter, the project of "Concrete Investigations" has been transferred from the Division of Rural Engineering and Field Experiments to this Division. A. T. Goldbeck, who was formerly connected with the laboratory force, has been appointed Testing Engineer in charge of this project, and

reported for duty on September 7. E. B. Smith, A.M.E., is cooperating with Mr. Goldbeck in Concrete Investigations.

The Testing Laboratory force has been increased by the addition of R. Harsch and C. E. Proudley, Laboratory Assistants, and D. A. Gardner, Student Assistant.

E. R. Eberle has been transferred to the Division of Construction and is now acting as an Inspector in the construction of the Mount Vernon Avenue Experimental Road.

Mr. Hubbard made an extended inspection tour through Florida, Louisiana, Texas, Arizona, and California, and also presented papers at the International Engineering Congress and the Pan-American Road Congress, which recently met in San Francisco. He is also studying the methods of producing and refining petroleums in the California oil fields. It is expected that he will return to the Office about October 7.

Routine Tests and Analyses.

77 samples of bituminous material were examined during August and September.

180 samples of rock, slag, cement, etc., were examined in the Physical Testing Laboratory during this period.

58 samples of rock, slag, etc., were examined and classified in the Microscopic Laboratory during this period.

Research Upon the Properties of Dust Preventives and Road Binders.

The erection of a small refining plant, referred to in the previous letter, is now under way on the Arlington Experimental Farm, and it is anticipated that the building will be fully equipped in the course of a few weeks, in order that research work may be inaugurated upon the various refining methods for bituminous materials.

Non-bituminous Road Materials Investigations.

Investigations upon the wearing properties of gravel were continued and considerable work was also done in plotting in graphic form the results of physical tests on the various types of road building rocks.

The Physical Testing Laboratory also cooperated with the Dairy Division in a continuation of an investigation to determine the effect of silage on cement concrete waterproofed with various substances.

Standardization of Methods of Testing.

An exhaustive study of the penetration test is now under way, in which an effort will be made to determine the effect of variations in time, temperature, weight, and method of preparing the sample, upon the results obtained on various types of materials.

In the Physical Testing Laboratory, work was begun on the development of a new test for the determination of the apparent specific gravity of rock.

Concrete Investigations.

Plans are under way and preparations in progress for the construction of another large slab. The details of this work will appear later.

Experimental Bituminous Road Construction and Maintenance.

In the early part of August, C. S. Reeve, Chemist, made a trip to Florida to confer with the officials of Palm Beach County regarding the type of construction to be followed under their recently authorized bond issue, and also cooperated with the Division of Construction in a study of sands to be used in the construction of a number of projected roads in Manatee County, Florida. Mr. Reeve also conferred

with other members of the American Society for Testing Materials with regard to the standardization of the penetration test.

B. A. Anderton, A.C., made a short trip to Charleston, West Virginia, to render advice to local authorities upon bituminous concrete construction now under way at that point.

Messrs. Reeve and Anderton have also cooperated with the Division of Construction in connection with the laying of bituminous surfaces on the Mount Vernon Avenue Experimental Road.

DIVISION OF ACCOUNTS.

W. Carl Wyatt in Charge.

Please return to this Office immediately all of the old project report forms that you have, as they are to be superseded by the new form, commencing with the month of September, and you will find on the back of each form full instructions as to how to fill out the form.

The use of a salary voucher, Form No. 3, will be discontinued hereafter, and a field pay roll will be substituted therefor, except for such employees as are on a per diem salary. An effort will be made to have the field pay roll in the hands of the Disbursing Office in time each month for the checks to be mailed out promptly on the first of the succeeding month, and it is hoped that the salary checks may reach all the employees by the 5th or 6th of the month. This arrangement will, of course, make it absolutely necessary that this Office be kept informed as to your address about the first of each month, and if any leave without pay is taken, a special letter should be written to the Office which may be referred to the accounting section for attention. In order that this plan may work out successfully, it will be necessary that you send in a project report promptly at the end of each month, in order that a proper distribution of salaries may be made on the books of this Office. The project report must be sent in whether a reimbursement voucher for traveling expenses is sent in or not.

DIVISION OF IRRIGATION INVESTIGATIONS.

Samuel Fortier, Chief.

Projects:

Administration.

During his extensive tour of the arid and semi-arid States, Mr. Fortier spent about ten days in Nevada in company with C. G. Haskell, I.E., visiting the districts in which cooperative work was being carried on. The University of Nevada and the Irrigation division contribute about $9,000 jointly during the current fiscal year for investigating the boring of wells and pumping, and duty of irrigation water. In this cooperation C. G. Haskell represents the Office and Dean J. G. Scrugham the University.

In the vicinity of Las Vegas in Southern Nevada a large artesian basin is being developed, about 100 wells having been sunk to date. Cooperative work is also being carried on at Indian Springs, some 45 miles north of Las Vegas. Other investigations which have to do with the drilling of wells and pumping plants are being carried on at Winnemucca, Battle Mountain, Elko, and the Carson Valley. Surface water supplies are also being measured throughout the Lamoille Valley in order to ascertain a proper duty of water for this district.

Mr. Fortier also spent considerable time with L. M. Winsor, A., in Southern Utah, investigating the development in irrigation taking place near Cedar City, Beaver City, Minersville, Milford, and Malone. At Malone they visited the pumping

plant installed by Messrs. McLaughlin and Winsor which supplies water to a 40-acre farm on which records are being kept for this Office.

When in California Mr. Fortier made a tour of the Sacramento Valley in company with Frank Adams, I.M., for the purpose of examining the cooperative work which has been in progress in that Valley for several years, investigating the duty of water for alfalfa and other standard crops. This work as regards alfalfa will be brought to a close at the end of this season and a report prepared by Messrs. Adams, Robertson, Beckett, and Hutchins, all of whom have taken a prominent part in the work.

Mr. Fortier also visited a number of the large irrigation districts in the San Joaquin Valley where investigations of a more or less cooperative nature are in progress.

Mr. Adams was authorized by the Secretary to represent the Office at the Irrigation Congress recently held in California, and presented a paper on the Review of State Laws regarding Irrigation Districts. Mr. Fortier was not able to attend this Congress but forwarded a brief paper covering the present status of irrigation in the West.

Upon reaching the Imperial Valley Mr. Fortier found that the work in which F. J. Veihmeyer, A.I.E., under C. E. Tait's supervision, had been engaged for nearly two years, could be brought to a close at the end of the two-year period. This has consisted in a rather broad study of the use and duty of water throughout certain portions of the Imperial Valley. Mr. Tait, I.E., who represents the Office in Southern California, will soon complete his report on mutual water companies and will then be prepared to resume the study of a report on the cleaning of irrigation canals. In this last work he will be assisted by Mr. Veihmeyer.

In returning East, Mr. Fortier stopped for a few days at Denver to supervise the installation of the new equipment at the field laboratory in Denver.

Use of Water.

C. G. Haskell, I.E., expects to close the season's cooperative experiments in Nevada on duty of water and on pumping for irrigation early in October and will then proceed to the Berkeley headquarters to work up results. After completing his report Mr. Haskell will be temporarily assigned to an investigation of wells in the rice country where he had worked several years prior to receiving the Nevada assignment. Provided the necessary authority is received from Congress it is expected that the Division will undertake an extensive series of investigations during the next fiscal year of the possibilities in development of undergound water supplies in the semi-arid and arid states, in which event Mr. Haskell's investigations this winter are expected to prove of much value. A large amount of data already collected by him on this subject will be incorporated with the results of this year's investigations and prepared for possible publication.

M. B. Williams, I.E., is now in the Pacific Coast States in an extension of his investigations on the utility of overhead spray irrigation for truck and orchard crops. The Office has received many requests from the West for advice as to the possibilities of such methods in the irrigation of high-priced crops and a number of plants have been installed at various points on the Pacific Coast. Before returning to his eastern field Mr. Williams will assist the authorities of the University of California in the installation of an overhead plant at the Davis farm.

F. W. Stanley, I.E., has been working in the New England and Central Atlantic States during the summer in conjunction with Mr. Williams but has now returned to Orlando, Florida, where he will work the greater part of the winter.

W. W. McLaughlin, I.E., who has been off the rolls for several months on account of serious illness, is expected to report for duty October 1 and will then resume his investigations on the movement of water in soils, starting out of Berkeley, California, and working at various points in the Southwest during the winter months.

F. G. Harden, I.E., expects to complete his assignment at Billings, Montana, with the close of September and has been instructed to report in Washington for work during the winter. It is expected that the duty of water data secured by Mr. Harden during the past season will be incorporated with previous results obtained by S. T. Harding, I.E., during the seasons of 1913 and 1914, and the series published as a Department bulletin. J. F. Kunesh, A.I.E., who has been assisting Mr. Harden in Montana has been transferred to Texas to assist W. L. Rockwell, I.M.

Recent numbers of Engineering News contained a two-part article by Mr. Fortier on Transmission Losses in Unlined Irrigation Channels. One of the purposes of the article was to refute some of the statements made by E. A. Moritz of the U. S. Reclamation Service in a previous article on the same subject in Engineering News.

The Colorado Experiment Station has just issued its bulletin No. 209 on Irrigated Agriculture in the San Luis Valley. The material for this publication was prepared by V. M. Cone, I.E., and Alvin Kezer and was submitted for approval at Washington at the time of Mr. Cone's visit here last spring. The bulletin discusses in detail the peculiar soil conditions which exist in the San Luis Valley and the resultant problems which have been encountered in irrigation development there.

Flow of Water.

F. C. Scobey, I.E., has returned from the field after completing the season's experiments on the carrying capacities of concrete and vitrified clay pipes, these being along similar lines to those carried on in previous seasons with reference to open channels and wood stave pipes. This year the work was carried on under a cooperative agreement between this Office and the U. S. Reclamation Service. The scope and number of these experiments are shown in the following table of tests.

Number of Pipes	Type	Diameter of Bore - Inches	Number of Observations
1	Cement	8	2
5	Cement	10	19
1	Vitrified	10	7
6	Cement	12	22
2	Vitrified	12	19
4	Cement	16	18
1	Concrete	30	3
2	Concrete	36	6
1	Concrete	46	3
1	Concrete	63	4
		Total	103

Customs, Regulations, and Laws.

During the past month an extensive correspondence has been carried on by the Office with members of the Investment Bankers Association and other dealers in irrigation securities, with a view to ascertaining the views of these bankers regarding the present situation in irrigation finances and their suggestions as to means by which irrigation securities may command a better market than they have at present. The correspondence has been unusually successful, a very marked interest being shown by the correspondents in the purposes of the investigation. As a result of this correspondence and previous studies along the same line which has been conducted by R. P. Teele, Irrigation Economist, it is expected that a report will be prepared for publication within a few months in which suggestions for a relief of the present situation may be presented.

DIVISION OF DRAINAGE INVESTIGATIONS.

S. H. McCrory, Chief.

Projects:

Administration.

S. H. McCrory left Washington August 3 on an inspection trip of the work in the irrigated sections and is not expected to return to Washington until about October 10. Enroute he stopped at Pittsfield, Illinois, to confer with the engineer of the Sny Island Drainage District. At Onawa, Iowa, after making an examination of conditions, he arranged to make a comprehensive plan of drainage of several districts in that section. At Omaha, Nebraska, he met C. W. Okey, S.D.E., with whom he made arrangements for future work in Florida. Resuming his journey he visited the Republican River drainage district in Nebraska. Thus far Mr. McCrory has conferred with Messrs. Miller, Heizer, Jessup, Sloan, R. A. Hart, Guy A. Hart, W. A. Kelly, and W. W. Weir, and inspected the work which these men are doing in the various fields.

Messrs. Miller, Heizer, and Jessup have established official headquarters at 301 Tramway Building, Denver, Colorado. At this Office representatives of the Irrigation division and Office of Public Roads are also stationed. Miss Mildred Withington, who has served in the Washington Office for several years as stenographer, has been placed in charge of the clerical work of the Denver Office.

Fred F. Shafer and J. V. Phillips during September were established with headquarters at Washington, D. C.

Wm. R. Overton, who has been connected with this division for several months as civil engineer student, resigned upon the completion of the Panther Creek Survey.

Geo. M. Warren who has been connected with the Drainage division in the capacity of Drainage Engineer for a number of years, upon the completion in August of his report on the Maintenance and Management of Drainage Ditches, was assigned to the Division of Rural Engineering and will devote his entire time to a study of Domestic Water Supplies and Sewage Disposal for the farm.

Farm Drainage.

During August, J. R. Haswell, D.E., devoted the greater portion of his time to assisting farmers in Delaware, Maryland, and on the eastern shore of Virginia.

H. M. Lynde, D. E., has been engaged in compiling data received from farmers relative to the efficiency of the drains which were installed on their farms during the past several years under the direction of Mr. Lynde.

C. E. Ramser, A.D.E., on August 14 commenced investigations in Georgia, Alabama, Mississippi, and the Carolinas relative to the efficiency and types of terraces in protecting farm lands from erosion.

F. E. Staebner, C.E.S., has been assigned to assist S. W. Frescoln on the experimental work relating to Kutter's "n" on the Arlington Farm, Va.

Reports Transmitted:

D-3 Wanabrook Farms, Bradford Co., Pa. - by J. R. Haswell, D.E.
D-5 Leonard Hall, St. Marys Co., Md. - by D. L. Yarnell, D.E.
D-5 S. S. Buckley Tract, College Park, Md. - by D. L. Yarnell, D. E.
D-6 G. W. Holland Farm, Northampton Co., Va. - by J. R. Haswell, D.E.
D-8X M. E. Sherwin Farm, Wake Co., N. C., - by H. M. Lynde, S.D.E.
D-10 O. M. Adams Lands, Washington Co., Ga., - by F. G. Eason, D.E.
D-11 American Tobacco Lands, near Quincy, Fla., - by C. W. Okey, S.D.E.

Reports Received:

D-8X McLendon Farm, Anson Co., N. C. - by H. M. Lynde.
D-9 Colleton Mercantile Mfg. Co. Farm, Colleton Co., S.C., - by F. G. Eason
D-9 Gibson Farm, Charleston Co., S. C., by F. G. Eason
D-9 Rice Farm, Colleton Co., S. C., - by F. G. Eason
D-29 Lucy Farm, Hot Springs Co., Ark., by O. G. Baxter, D.E.

Overflowed Lands.

J. V. Phillips, D.E., has completed the field work on the Panther Creek Drainage District, Kentucky, and is now at the Washington Office preparing the report and plans.

D. L. Yarnell, assisted by Willis E. Comfort, C.E.S., has been assigned to the preparation of a comprehensive plan of drainage for the Monona-Harrison Drainage District near Onawa, Iowa.

F. G. Eason, during August and September, made preliminary examinations of a number of streams in Georgia.

Reports Transmitted:

D-9 Congaree River, Richland Co., S. C. (supplemental report) - by F. G. Eason.
D-10 Shoal Creek, Clarke Co., Ga., - by F. G. Eason, D.E.
D-10 Ochillee Creek, Chattahoochee Co., Ga., - by F. G. Eason, D.E.
D-10 Gully Branch, Pierce Co., Ga., - by F. G. Eason.
D-10 Rose Creek, Oconee and Greene Counties, Ga., - by F. G. Eason, D.E.
D-10 Hominy Creek, Carroll Co., Ga., - by F. G. Eason, D.E.
D-24E Mayfield Creek, Drainage District, in Graves, McCracken, Carlisle, and Ballard Counties, Ky., - by F. F. Shafer, D.E.
D-29 Jack Bayou Drainage District, Lonoke Co., Ark., - by O. G. Baxter, D.E.
D-29 Crooked Bayou (Black Pond) Drainage District, Desha Co., Ark. (Inspection of improvements) - by O. G. Baxter.
D-29 Flushman Bayou Drainage District, Ashley and Chicot Cos., Ark., - by O. G. Baxter.

Reports Received:

D-29 Drainage in Clay Co., Ark., (Progress) - by O. G. Baxter.

Irrigated Lands.

D. E. Heizer during August and September assisted a number of farmers in the vicinities of Worland and Manderson, Wyoming. Most of the farmers for whom he staked out drains are now installing the tile. On August 21-22, Mr. Heizer gave assistance to farmers near Gordon and Irwin, Nebraska.

L. T. Jessup, during August and the fore part of September, was operating in the vicinity of Canon City, Colorado. The latter half of the September he was engaged on the Hershey Drainage District, Nebraska.

D. G. Miller during September was at Alamosa, Colorado, where in cooperation with Jay D. Stannard of the Reclamation Service he was collecting field data to be used in devising a plan for adequate drainage outlet forthe San Luis Valley. The proposed scheme contemplates the development of water by drainage from the seeped lands of the valley for the Elephant Butte, New Mexico, irrigation project of the Reclamation Service. Messrs. Miller and Stannard are now at the Denver office compiling their data.

Reports Transmitted:

D-34D Drainage District No. 1, Ada Co., Idaho - by W. G. Sloan, D.E.
D-42 Tillamook Drainage District, Tillamook Co., Ore., - by G. A. Hart, J.D.E.

Reports Received:

D-32A Ross Farm, near San Benito, Tex., - by W. N. Hall.
D-36 Lennox Tract, near La Junta, Colo., - by L. T. Jessup.
D-36B Grand Valley, Colo., by D. G. Miller.

Run-off Investigations.

Reports Transmitted:

D-29M Run-off in Northeast Arkansas - by O. G. Baxter, D.E.

Reports Received:

D-27I Run-off Investigations, Bolivar Co., Miss. - by C. E. Ramser.

Construction, Operation, and Maintenance of Drainage Improvements.

R. A. Hart during August supervised the making of the cement tile to be installed this year to continue the cooperative tests being made by this Office, the U. S. Reclamation Service, and the Bureau of Standards, on the effect of Alkalis on such tile. During September the tile were shipped to the various experimental tracts.

Reports Received:

D-59 Maintenance and Management of Drainage Ditches, - by Geo. M. Warren, D.E.

Peat, Turf, and Muck Investigations.

J. R. Haswell, who has been assigned to assist in these investigations, spent a large portion of September studying muck lands in New York.

C. W. Okey devoted considerable time during August and September to studying muck lands in Louisiana.

Organization, Financing, and Legal Regulations of Drainage Districts.

From September 13-17 inclusive, H. S. Yohe devoted his attention to a study of the organization of the Miami Valley Conservancy District, Ohio. The legal problems which the district has encountered were discussed carefully with the attorney of the district. Consultation was also had with the Board of Appraisers of the District who must make appraisals of over 150,000 pieces of property, including urban, rural, electric and steam railway property.

On September 18 Mr. Yohe conferred with several bonding houses and bankers in Chicago concerning drainage securities. From September 20-22 he was in attendance at the annual convention of the Investment Bankers Association of America which met in Denver. Among the various subjects considered at this meeting were drainage and irrigation securities. While in Denver many of the investment bankers of that city were interviewed with a view to interesting them in drainage bonds issued by drainage districts in irrigated sections. The drainage law of Colorado was also discussed with several prominent attorneys who are employed by bonding houses to pass on drainage securities. In return to Washington Mr. Yohe spent September 29 in St. Louis to confer with some of the leading drainage bond houses of that city.